Not Your Daddy's Data Link

Musings on Datalink Communications

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By

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Keen Eye for a Straight Proposal
(Next Gen Data Link)

Reassess missions & goals of current programs

Integrate new services & ideas

Make business case for operable system
(consolidate/near-term/future systems

“Supplemental” Datalink Service (SDS)

Multi-Mode DataLink Radio

So many datalinks …
… so little funding!!!

FAA programs under economic scrutiny

- **CPDLC: Still a good idea**
- **NEXCOM: Digital imperative/Long deployment**
- **LAAS: Done in by economic times**
- **ADS-B: Next for the axe?**

Brave New World

Security Issues

- new national goal after 9-11
- flight deck video (real-time)
- Secure flight tracking (non-defeatable)
- Independent and secure communications (air marshal & TSA personnel)

Time marches on!

- Efficiency & Economy of operations
  - FAA & Airlines – controller/pilot workload
- New service at small airports and in non-radar airspace
  - General Aviation (SATS) – Cockpit centric ATM, Self Separation
- Maintenance operations
  - Downlink aircraft service data
- Ground operations
  - Aircraft & Ground vehicle – surface movement coordination

Through the Looking Glass

Combine program attributes (synergy)

- Meet multiple agency/community requirements economically
- Provide stepwise,integrated system to serve basic needs
- Design secure, more robust system

Develop a long-range plan

- Boeing & Inmarsat quasi-working global ATC
- FAA's dime ran out with NEXCOM

Look for partnering opportunities

Dollars & Sense Cooking

Business case needed for individual and agency investment

Safety and security need only economic footing

TSA/DHS interests may become major driver of technology – *not* the market

SATS innovative requirements may wag the dog

Economics 101

Look at big picture

- Smaller airlines + lower cost = reduced AIP funding
- Pay for service around the corner; handwriting

FAA: Coordinate & Capitalize on existing programs

Aviation community: Look for new sources of funding

The Missing Link(s)

VHF services will NOT provide "wide-band" communications environment

NEXCOM (as currently cast) not well understood

- Will NOT extend communications coverage to additional airspace
- Poised to provide relief "voice" capacity for overcrowded enroute sectors and terminal areas
- Long wait for data service

UAT does not offer an addressable service

Straight Shooting

Reformat NEXCOM program for near-term services

- Reassess (optimize) VDL modes (-2, -3, -4)
- Deploy at SATS airports enabling new services
- Simultaneously provide enroute CPDLC service

Develop long-range plan encompassing all needs

- "Supplemental Datalink Service"
- Support with "fast-track" R&D program

Plan *interoperable* systems & services

All is not lost

CPDLC investments:

- Capitalize on infrastructure developed for MIA trials
- Continue development of controller interfaces and network infrastructure

NEXCOM investments:

- Deploy (limited) VDL “data-early” service (forget digital voice)
- Network infrastructure being designed (Harris & ??)
- Continue ground radio procurement (providing basic infrastructure)
- Prototype avionics procurement (Rockwell, Avidyne)

A Keen "Aye" for service
(aka Supplemental Datalink System)

Provide enhanced capability for all aircraft
- Wideband
- Secure
- Addressable

Enable new services in all airspace/for all users
- Untowered airports
- Uncontrolled airspace
- Enroute

Acknowledge roadblocks not heretofore considered
- NEXCOM incapable of wideband service
- UAT not addressable

Aspects of love (High Speed Access)

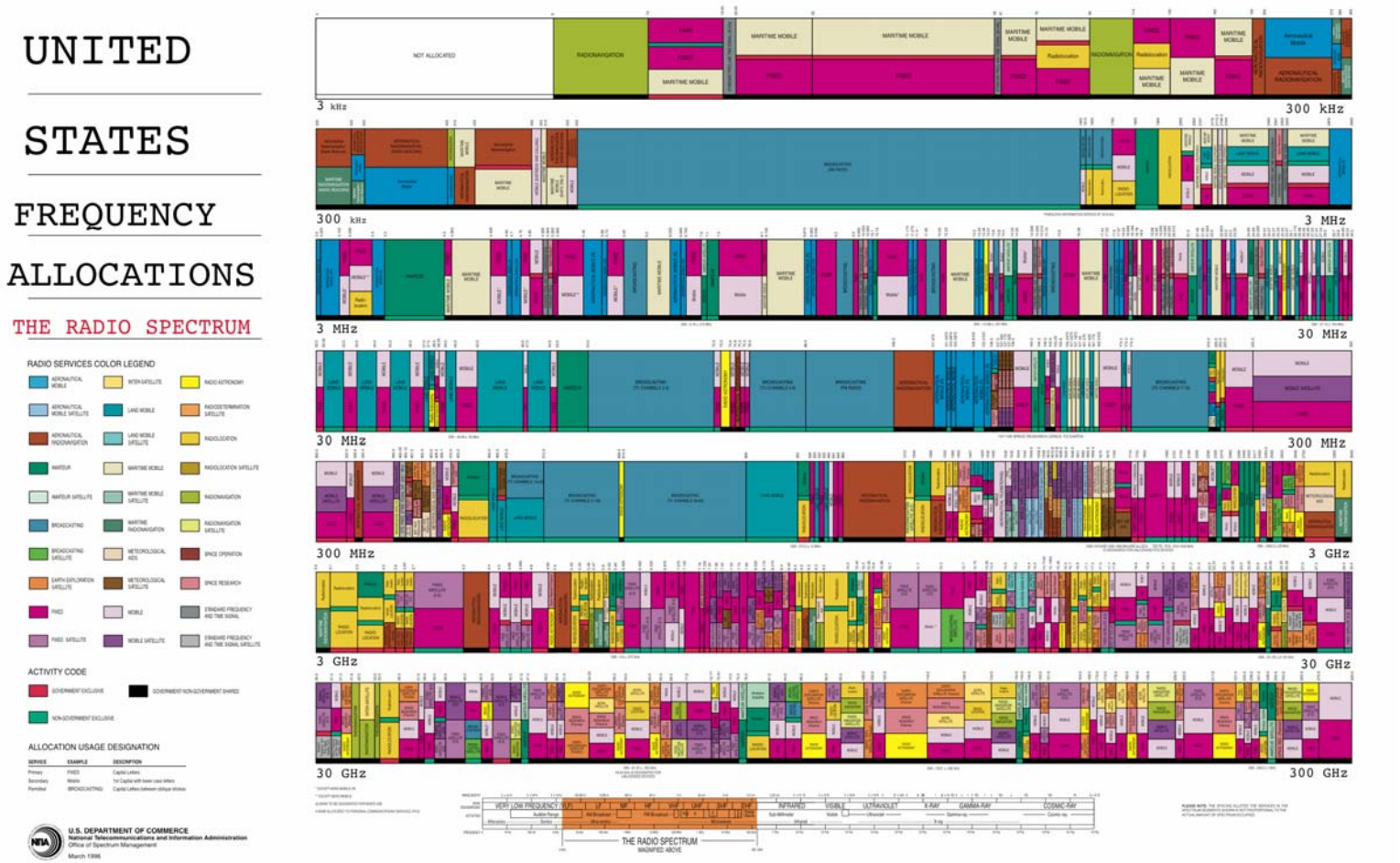
Wide-bandwidth capability– to handle new security needs and pilot service applications
- Data
- Video
- Voice (VoIP)

Scaleable channel capacity to meet requirements of various operating environments
- Terminal areas/Major airports – supplement existing
- Untowered airports – will be "primary" means of CNS

Secure and robust systems to assure integrity

Open standards (TCP/IP)

Terms of Endearment



Back to the Future

Investigate RF Spectrum reclamation/reuse

- "Alternative Comm Spectrum Study" by Ohio U. AEC
- "Overlay" service on existing frequencies
- C-band (abandoned MLS spectrum; "owned" resource)

Employ state-of-the-art modulation schemes

- Future-generation cellular/WAN techniques
- Spread-spectrum communications techniques

Probe Research by NASA, DoD

The Road Less Traveled

"C-band" – an extinct Dodo bird – not!

- Wide swath of spectrum available allowing wideband comm design
- "Shared" spectrum allocation allows AOC/APC communications to coexist
- Clean sheet afforded for design considerations (modulation scheme & channel plan)
- No haggling, we "own" the frequency band

Who's on First

National imperative to save MLS frequency band from jaws of 5-G/WAN (next WRC)

SATSLab flight tests at 5.8 Ghz (802.11a)

Europeans conducting leading research

Inmarsat L/C-band satellite launch

R&D opportunities abound for prototype avionics

- RF power generation onboard in small packages
- High-gain antenna design (especially for small aircraft)

Where's the Beef?

Airborne Internet – the way, the truth, & light

Killer apps designed – sans "implemented" connectivity

SATS & partners – avenue for experiment

Avant-guard research efforts (FAATC lab)

Opportunity for collaboration (AICG, NASA, DoD)

Count the Players

NEXCOM program office

- Early deployment of a trial VDL-3 “data only” service

TSA/DHS involvement

- Invite participation

SATS research partners

- infrastructure to conduct proof-of-concept

FAA, NASA, DoD

- Focused R&D initiatives

The Future Is NOW!

Airborne Internet Collaboration Group

- Multifaceted group – sounding board for aviation community
- Create new aviation standard for A.I.
- Forum for expanded flight safety interests

SATS

- Support "self-controlled airspace" philosophy
- R&D expertise among members

Identify resources for funding prototype activities

… *“et al.”* …

SBIR , STTR programs (FAA and NASA)

Centers of Excellence/Joint Univ Program

NASA directed programs (GRC)

- NextNAS, ATAS

DoD programs

- Joint Tactical Radio System
- Global Information Grid

Piece de Resistance
(Multi-Mode Data-Link Radio)

Opportunity to combine best aspects of:

- VDL -2, -3, -4 to provide data-only services
- 8.33 analog – stopgap voice problem mitigation
- SDS deployed on wide area basis (? C-band)
- ADS-B – supportable with new system (900 M)

Need to make as *cheaply* as possible so all can "buy in" – and large scale benefits accrue

Simon says – err, the "Fab-5" say:

Time ripe to revisit & recast multiple programs

Integrate security & new service applications

Make the business case

Focus R&D efforts

- SDS (wideband)
- MMDLR

Capitalize on collaborative R&D

Th-th-th-that's All! – Folks

Thank you for listening

Comments invited

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OUAEC report on AI website:

http://www.airborneinternet.com

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